Department of Health and Human Services
Agency for Toxic Substances & Disease Registry

31 July 2008

Memorandum

To: Ken Theisen
On Scene Coordinator
U.S. EPA Region 5

From: Michelle Watters, MD, PhD, MPH
Medical Officer, Division of Regional Operations
Agency for Toxic Substances and Disease Registry

Subject: Review of Site Assessment Report for Lac du Flambeau Fireworks Stand, Lac du Flambeau, Vilas County, Wisconsin

At your request, and on behalf of the Region 5 Agency for Toxic Substances and Disease Registry (ATSDR) office, I have reviewed the Site Assessment Report for Lac du Flambeau Fireworks Stand, Lac du Flambeau, Vilas County, Wisconsin prepared by Weston Solutions, Inc. for the USEPA (dated July 7, 2008) to evaluate whether the perchlorate contamination found in the soil and groundwater posed a threat to human health. I also reviewed the recommendations proposed for the site to determine whether they would be protective of public health.

Background and Statement of Issues.
In October of 2006, a fire destroyed a building that housed a fireworks stand, pawn shop and auto repair shop located in Lac du Flambeau, Wisconsin near Haskell Lake. Debris was removed in July 2007 and in October 2007 soil borings and groundwater samples were taken as part of a Phase II environmental site assessment. Perchlorate was detected in on-site soil samples at 22 parts per billion and in groundwater from in an on-site well at 670 µg/L and in soil probes at 4,300 µg/L. Perchlorate was not detected in groundwater from four wells adjacent to the site.

As you described in your e-mail, there is one residence, the tribal headquarters, a motel and restaurant that are close to the site. In January 2008, EPA was requested to evaluate the possibility of off-site contamination. Perchlorate was not detected in six groundwater samples from nearby private wells. However, given the visual site reconnaissance, a full-scale site assessment was initiated in the spring.

Site reconnaissance in May 2008 revealed the presence of scattered debris, a half full oil drum and a couple of compressed gas cylinders. On-site sampling was conducted in May 2008 for wipes, solids, sediment, surface water, soil and groundwater. Perchlorate was found at three soil boring locations drilled into the building concrete slab; six samples

had concentrations ranging from 120 to 900 mg/kg. Detection of perchlorate in sub surface soils suggests that leaching from the surface to the groundwater is occurring.

Groundwater is encountered at depths ranging from 6.5 to 9 feet below ground surface. The soil is predominantly sand or sandy silt. No direction of groundwater flow was provided. Eight of ten groundwater samples contained perchlorate at concentrations ranging from 9.8 to 120 µg/L. Wipe sampling of the floor and walls of the building revealed detectable levels of perchlorate.

As described in the Site Assessment Report, WESTON is recommending removal of perchlorate containing soil from underneath the building; either bioremediation or monitoring natural attenuation of perchlorate contaminated groundwater; demolition of the building or decontamination of building surfaces; and removal of the drum, gasoline can, and gas cylinders from the site.

Discussion

Perchlorates are colorless salts that rapidly dissolve in water. They are very reactive when heated so are used in fireworks and explosives. They are also used in the production of other chemicals. Perchlorates have been used medicinally for thyroid related diseases. (ATSDR September 2005. Toxicological Profile for Perchlorates, Draft for Public Comment).

The thyroid is the major target organ of perchlorate toxicity and the major health effect is related to the ability of perchlorate to block iodine uptake by the thyroid. Because children require thyroid related hormones for growth and development, they are considered a sensitive population for perchlorate exposure. Ingestion of contaminated drinking water is the primary exposure route. Ingestion may also occur when eating with hands contaminated with perchlorate dust.

ATSDR has developed health guidelines and environmental guidelines to use when conducting the screening analysis and evaluating exposures to substances found at sites. ATSDR's environmental media evaluation guides (EMEGs) are media-specific substance concentrations derived from health guidelines using default exposure assumptions. They are available for exposure to substances in water, soil, and air for exposures during a specified period of time (acute, intermediate or chronic) without experiencing adverse health effects. For perchlorate, EMEGs have been derived for chronic exposure during the ingestion pathway for soil and drinking water for children and adults.

Based on the sampling data, residents are not currently exposed to site-related perchlorate from drinking water from private wells. On-site groundwater perchlorate concentrations (9.8 to120 µg/L in eight of ten samples) exceed the chronic drinking water EMEG for children of 7 µg/L. While perchlorate was detected in six sub-slab soil samples at concentrations ranging from 120 to 900 mg/kg, there is no direct contact with the subslab contaminated soil. ATSDR's health based comparison value for soil is 40 mg/kg for a chronically exposed child. Because of the on-site perchlorate contaminated soil, demonstrated migration of perchlorate into the groundwater, and the use of private wells

for drinking water in the community, the potential exists for future exposure to perchlorate in drinking water. The proposed mitigation measures described in the site assessment report addresses sub-slab soil source removal and monitoring and remediation of groundwater. These actions would limit the likelihood of perchlorate exposure by community members.

The building contains some hazardous materials, residual perchlorate dust, and safety hazards secondary to fire damage. The proposed site mitigation addresses removal of these hazardous materials and clean-up or demolition of the building. These actions would limit current and future exposures.

Conclusions

Residents off-site have not been and are not currently exposed to site related perchlorate contamination of their drinking water. However, the potential for future exposure to perchlorate contaminated drinking water exists. Residents are not currently exposed to perchlorate in sub-slab soil. The building contains some hazardous materials and is a safety concern from fire damage. The proposed site mitigation would be protective of public health.

Recommendations

EPA should consider implementation of the proposed site mitigation measures described in the site assessment report. In the interim, if not already in place, measures should be taken to restrict building access.

Cc (by e-mail):

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